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10/667,823	09/22/2003	Osamu Nozawa	0524-0140.01	1017

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EXAMINER
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MCDONALD, RODNEY GLENN

ART UNIT	PAPER NUMBER
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1753

MAIL DATE	DELIVERY MODE
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05/18/2007

PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

## Office Action Summary

Application No.

10/667,823

Applicant(s)

NOZAWA ET AL.

Examiner

Rodney G. McDonald

Art Unit

1753

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 19 October 2006.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 39-49 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 39-49 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- ☒ Notice of References Cited (PTO-892)
- ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- ☐ Information Disclosure Statement(s) (PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_
- ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_
- ☐ Notice of Informal Patent Application
- ☐ Other: \_\_\_\_\_

## DETAILED ACTION

### *Claim Rejections - 35 USC § 103*

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claims 39 and 40 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kim et al. "Attenuated phase-shifting masks of chromium aluminum oxide", Applied Optics, Vol. 32, No. 19, July 1, 1998 in view of Ito et al. (Japan 09-157841), Robison et al. (U.S. Pat. 3,718,572) and Sako et al. (Japan 08-293469).

Regarding claim 39, Kim et al. teach an apparatus for depositing a phase-shifting mask layer for a photomask. (See Abstract) The apparatus is shown in Fig. 3 with the target directed downward in the direction of gravity and the substrate directed upwards with respect to the direction of gravity. (See Fig. 3; page 4255) Table 1 shows the

parameters used when depositing the film. (See Table 1; page 4256) Kim et al. further teach utilizing DC magnetron sputtering for forming the film. The apparatus has at least a sputtering target, a magnetron cathode, a substrate holder. The surface of the target is directed downwards with respect to a gravity direction. (See Kim et al. page 4255)

The differences between Kim et al. and the present claims is that utilizing a shield which is detachably disposed is not discussed (Claim 39), utilizing a shield that has a shape such that a position on the shield in the vicinity of the target and the target is of sufficiently long distance so as to prevent a relative film formation speed on the shield from being larger than that on the substrate (Claims 39, 40) and the shield having a rounded shape with no corner is not discussed (Claim 39).

Regarding a detachable shield (Claim 39), Ito et al. show a detachably shield for preventing particles. (See Ito et al. Fig. 2)

The motivation for providing a detachable shield is that it allows for exchanging the shield after a period of use. (See Ito et al. Abstract)

Regarding the utilization of a shield that has a shape such that a position on the shield in the vicinity of the target and the target is of sufficiently long distance so as to prevent a relative film formation speed on the shield from being larger than that on the substrate (Claim 39), Robison et al. teach in Figs. 1 and 2 a shield 17 that has a shape such that a position on the shield in the vicinity of the target and the target is sufficiently long distance so as to prevent a relative film formation speed on the shield from being larger than that on the substrate. (See Figs. 1 and 2; Column 3 lines 53-57) See Annotated Figure below.

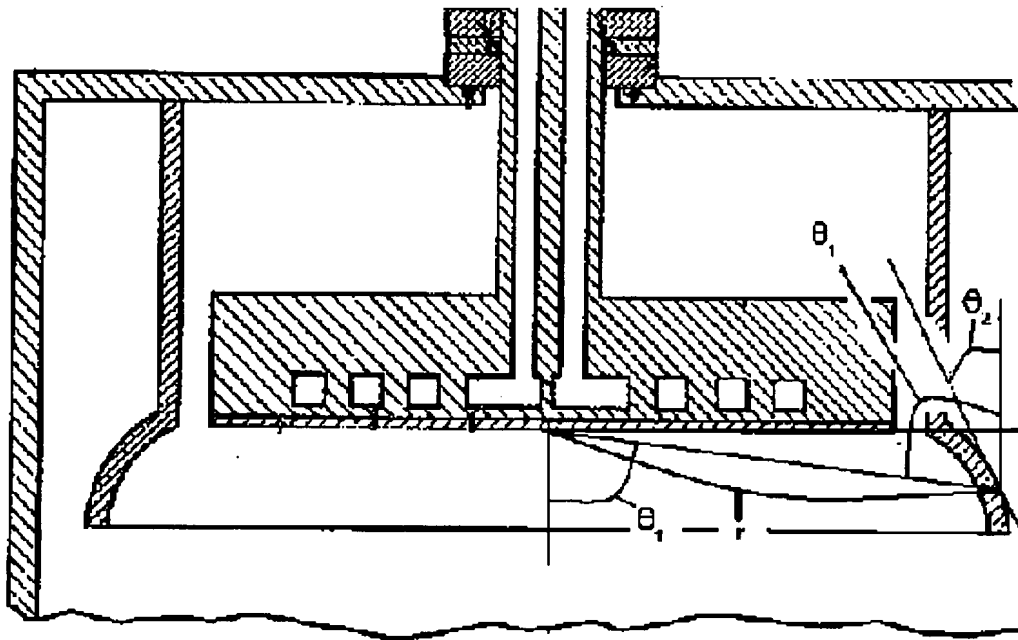


Figure 3

The motivation for utilization of a shield that has a shape such that a position on the shield in the vicinity of the target and the target is of sufficiently long distance so as to prevent a relative film formation speed on the shield from being larger than that on the substrate is that it allows for restricting the sputtered particles to the immediate area of the workpieces. (Column 3 lines 53-57)

Regarding the shield having a rounded shape with no corner (Claim 39), Ito et al. show in Fig. 5 providing a rounded shape with no corner. (See Ito et al. Fig. 5) Sako et al. teach that the tip part should have no corner and be rounded. (See Sako et al. Abstract)

The motivation for providing rounded portions on the shield is that it prevents scattering of particles. (See Sako et al. Abstract)

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified Kim et al. by utilizing the features of Ito et al., Robison et al. and Sako et al. because it allows for restricting sputtered particles to the immediate area of the workpieces and for exchanging shields after use.

Claim 41 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kim et al. in view of Ito et al., Robison et al. and Sako et al. as applied to claims 39 and 40 above, and further in view of Tanaka (U.S. Pat. 5,824,197).

The difference not yet discussed is grounding the shield. (Claim 41)

Regarding claim 41, Tanaka teaches grounding a shield. (Column 4 lines 29-30)

The motivation for grounding the shield is that it allows for improving sputter deposition uniformity. (Column 2 lines 50-51)

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have utilized the features of Tanaka because it allows for improving sputter deposition uniformity.

Claim 42 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kim et al. in view of Ito et al., Robison et al., Sako et al. and Tanaka as applied to claims 39, 40 and 41 above, and further in view of Katsura et al. (U.S. Pat. 4,933,063).

The difference not yet discussed is where the shield is kept at constant temperature. (Claim 42)

Regarding keeping the shield at constant temperature (Claim 42), Katsura et al. teach the use of heater for heating a protection plate to a specified temperature and to maintain the specified temperature after sputtering is complete. (See Abstract)

The motivation for providing a heater to a shield is that it allows for reducing the amount of dust particles. (Column 2 lines 24-26)

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have utilized a shield kept at constant temperature as taught by Katsura et al. because it allows for reducing the amount of dust particles.

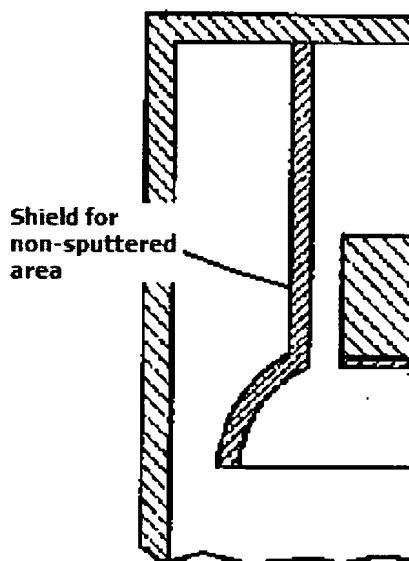
Claim 43, 44 and 48 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kim et al. in view of Ito et al., Robison et al., Sako et al. and Tanaka as applied to claims 39, 40 and 41 above, and further in view of Mintz et al. (U.S. Pat. 6,162,297).

The difference not yet discussed is the shield having a roughened surface.  
(Claim 43)

Regarding the shield having a roughened surface (Claim 43), Mintz et al. teach knurling a shield to provide a roughness for reducing particle contamination. (Column 1 lines 60-68; Column 2 lines 9-20; Column 2 lines 24-34)

The motivation for roughening the surface of a shield is that it reduces particle contamination. (Column 2 line 25)

Regarding the shield extending above the target surface to be sputtered (Claim 48) and a target shield for shielding a part of the target which is not subjected to sputtering (Claim 44), Robison et al. teach a shield extending above the target surface to be sputtered and for shielding a part of the target which is not subjected to sputtering.  
(See Fig. 3)



The motivation for providing a shield extending above the target surface to be sputtered and for shielding a part of the target, which is not subjected to sputtering is that it allows restricting sputtered particles to the immediate area of the workpieces. (Robison et al. Column 3 lines 53-57)

Therefore, it would have been obvious to one of ordinary skill art at the time the invention was made to have utilized a roughened shield as taught by Mintz et al. because it allows for improving sputter deposition uniformity at low pressures and reduces particle contamination.

Claim 45 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kim et al. in view of Ito et al., Robison et al., Sako et al. and Tanaka as applied to claims 39, 40 and 41 above, and further in view of Mostovoy et al. (U.S. Pat. 6,428,663).

The difference not yet discussed is where the target is attached to a backing plate having a roughened surface. (Claim 45)



Regarding where the target is attached to a backing plate having a roughened surface (Claim 45), Mostovoy et al. teach a target which has a front surface 103 and side surface 105. A coating 107 is applied to the side surface 105 of the target 101 (i.e. to shield the side surface) The coating 107 preferably has a surface roughness greater than 200 microinches. The coating may also be applied to a portion of the target's backing plate 108 as shown in Fig. 2. (i.e. to shield that portion of the backing plate). (Column 3 lines 38-47)

The motivation for providing a mechanism for shielding the surface of the non sputtered area of the target and roughening the backing plate is that it allows for preventing crumbling of sputtered particles. (Column 3 line 55)

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have roughened the backing plate as taught by Mostovoy et al. because it allows for preventing crumbling of sputtered particles.

Claims 46 and 47 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kim et al. in view of Ito et al., Robison et al., Sako et al., Tanaka and Mostovoy as applied to claims 39, 40, 41, 45 above, and further in view of Fujikawa et al. (01-173718).

The difference not yet discussed is where a shield plate is provided for preventing the film from being formed on a peripheral portion of the substrate. (Claim 46) and where there is a gap between the peripheral portion of the substrate and the shield (Claim 47)

Regarding claim 46, Fujikawa et al. establish the teaching of providing a substrate 2 opposite a target for sputtering and shielding the peripheral part of the substrate 2 from the target and a light shielding film is formed by sputtering. (See Abstract)

The motivation for shielding the peripheral edge of the substrate is that it allows for preventing electrification of the plate when electron exposing. (See Fujikawa Abstract)

Regarding claim 47, Tanaka show in Fig. 4 a gap between the substrate and the shield. (See Tanaka Fig. 4)

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have utilized a shield plate for preventing the film from being formed on a peripheral portion of the substrate as taught by Fujiwara et al. and Tanaka because it allows for preventing electrification of the plate when electron exposing.

Claim 49 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kim et al. in view of Ito et al., Robison et al., Sako et al. and Tanaka as applied to claims 39, 40 and 41 above, and further in view of

The difference not yet discussed is the magnetron cathode for whole surface erosion. (Claim 49)

Regarding claim 49, Ballentine et al. teach utilization of a magnetron the ensures that erosion occurs over the entire surface of the target so that the target is kept clean

during the sputtering process. (Column 1 lines 55-59) The substrate can be an optical element. (Column 3 lines 13-16)

The motivation for utilizing a magnetron that utilizes whole surface erosion is that it allows the target to be kept clean during sputtering. (Column 1 lines 55-59)

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have utilized the features of Ballentine et al. because it allows for keeping a target clean during sputtering.

### ***Response to Arguments***

Applicant's arguments filed October 19, 2006 have been fully considered but they are not persuasive.

In response to the argument that Robison does not teach a sputtering film formation rate for a position on the shield is not larger than a film formation rate for a position on the substrate, it is argued that Robison's shield shape would inherently have a sputtering film formation rate for a position on the shield not larger than a film formation rate for a position on the substrate. This is because Robison's shield shape is bowed outwardly similar to Applicant's shield shape. This outward curvature would result in a lower sputter formation rate on the shield than on the substrate which is directly located beneath the target. (See Robison discussed above)

In response to the argument that Robison does not teach the shield having a rounded shape with no corner, it is agreed that Robison do not show a shield having a rounded shape with no corner but the secondary references to Ito et al. and Sako et al. suggest that having rounded or curved features will eliminate particle contamination.

***Conclusion***

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Rodney G. McDonald whose telephone number is 571-272-1340. The examiner can normally be reached on M-TH with every Friday off..

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nam X. Nguyen can be reached on 571-272-1342. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Art Unit: 1753

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.



Rodney G. McDonald  
Primary Examiner  
Art Unit 1753

RM  
May 15, 2007